

for the various subjects of the mineral kingdom, the work, however, supplies a want which has been long felt, and it will prove convenient for purpose of reference. The amount of detail will be better appreciated if we mention that in the description of the uses of carbonate of lime even the hammers used by stonemasons are specially figured.

### LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

#### Photographing the Aurora Borealis

I SHOULD be obliged if I might be permitted to state, with reference to the negative of the aurora borealis obtained by Mr. Tromholt in Christiania on March 15 (NATURE, vol. xxxi. p. 479)—the first ever obtained—that he now informs me that, although the plate was exposed for eight and a half minutes, the said impression is so faint and imperfect that it cannot be reproduced as a positive. My object in asking to be allowed to mention this important fact is to show that the opinion expressed by Mr. Tromholt in his work just published, "Under the Rays of the Aurora Borealis," that it is almost impossible to photograph the aurora borealis on account of the small strength of light and its limited chemical action, may be said still to hold good in the main.

CARL SIEWERS

#### Speed and Velocity

YOUR reviewer of Williamson and Tarleton's "Dynamics" (NATURE, February 26, p. 385) speaks of the confusion therein of *speed* and *velocity*. Does he mean that these words should now be used in distinct senses? If so, would he kindly specify the distinction, which is unknown to me and my friends.

B.

[Certainly. Velocity is a directed quantity, or Vector. Speed is its Tensor.—YOUR REVIEWER.]

#### Time.—Thunderbolts.—Vision.—Sunglows

ON my return from a magnetic tour along the Red Sea, I ask leave to refer to some back numbers of NATURE. In vol. xxxi. p. 125, Latimer Clark is quite right when he says that mean and sidereal time ought to be distinguished by names. I should prefer a step farther, and use for the latter the decimal angle, thus abolishing our frequent and tiresome conversion of time into space, and *vice versa*. The resulting advantages would be obvious.

Answering Herr Von Danckelman's remarks in vol. xxxi. p. 127, I beg leave to quote my memoir, "Sur le Tonnerre en Éthiopie," published in 1858 by the French Institute, among its *Mémoires des Savants Étrangers*. Facts mentioned there do not support the opinion that fatal thunderbolts are all but unheard of in Tropical Africa.

In your published remarks on vision, is it not Lord Rayleigh who says that the supposed superiority of eyesight among savages may be explained otherwise? Years ago, when reading Bergmann's travels among the Kalmouks, I noticed his remark that when examining camels returning to the fold, those natives distinguished sexes with their naked eyes just as well as he could through his excellent field-glass. In conclusion, Bergmann says that savage eyes are superior to civilised ones, or something to that effect. I must confess that I then accepted his opinion as being admirably warranted by the quoted facts. However, some time afterwards I was travelling on foot in the Pyrenees with a Basque illiterate peasant, and a splendid refractor by Cauchoix, which I proudly carried myself. My companion having tauntingly asked me why I had not left that lumber at home, I gave him, foolishly, a lecture on optics, and wound up by saying that the glass enabled me to distinguish a cow from an ox, even from that distant hill. He said he could do as much without my lumber. I then selected a cow grazing, and asked him what that was. "Wait till the brute walks," said the

peasant; and at its first step he exclaimed: "it is a cow." I tried him, then, several times, and never found him in fault. He affirmed that cows and oxen do not lift their legs in the same way. May I request your rural readers to tell us whether that remark applies to English cattle? When on the Atlantic a sail was announced for the first time. I could perceive nothing, because I had not yet learnt what kind of a hazy thing I should distinguish. Having then sharp eyesight, I succeeded after a short practice, in discerning distant sails before any of my companions, and could turn tables on them by repeating their own saying, "*Ça crève les yeux*."

To your lore on far-sightedness in vol. xxxi. p. 506, allow me to add two instances. Zach saw from Marseilles, Mount Canigou (2700 m.), at a distance of 158 English miles; he had calculated the true azimuth beforehand, and says that the peak bursts into view at sunset. Sir W. Jones informs us that the Himalayas have been seen at the great distance of 244 miles. I quote this from Carr's "Synopsis," a useful volume, which I regret to see behindhand in many cases since the death of its clever author.

May I intrude here a comment on our mysterious sunglows? My companion having a nice eye for discriminating colours, has confirmed my notion that on rising from the horizon the successive nuances of fiery red, faint red, rose, mallow, prussian blue, and green, are not the same on consecutive days, although thermometer, barometer, and wind have not changed. This suggests the hypothesis either that the lower strata of our atmosphere undergoes changes otherwise unperceived, or that there are maxima, minima, and perhaps regular epochs in the phenomenon. To those who, unlike myself, remain stationary under a rainless sky like that of Egypt, I would recommend a careful record of these changes, at least during a few months.

Cairo, April 22

ANTOINE D'ABBADIE

#### Plutarch on Petroleum

THERE is in "Plutarch's Lives," in the life of Alexander, an interesting notice of the petroleum of Media; I have not found any mention of this passage in "Plutarch" either in encyclopædia or chemical dictionary; I trust, therefore, that you will give me the opportunity of reproducing it in NATURE. I transcribe the passage from the translation of John and William Langhorne (9th edition, London, 1805):—

"... and in the district of Ecbatana he (Alexander) was particularly struck with a gulph of fire, which streamed continually as from an inexhaustible source. He admired also a flood of naphtha, not far from the gulph, which flowed in such abundance that it formed a lake. The naphtha in many respects resembles the bitumen, but it is much more inflammable. Before any fire touches it, it catches light from a flame at some distance, and often kindles all the intermediate air. The barbarians, to show the king its force and the subtlety of its nature, scattered some drops of it in the street which led to his lodgings; and, standing at one end, they applied their torches to some of the first drops, for it was night. The flame communicated itself swifter than thought, and the street was instantaneously all on fire."

W. H. DEERING

Chemical Department, Royal Arsenal, Woolwich, May 6

#### Hut Circles

THE remains of the ancient British habitations on the downs on both sides of Dunstable are fairly well known to archæologists. I have often wished to expose the floor of one or more of these circles, as the task could be accomplished with a spade in an hour or two. It is, however, far better that the remains should be left alone, as it is not likely that anything would be found beyond a few flakes and the other simple forms, such as are abundant in the cultivated fields close to the huts.

On passing some of the circles on the east side of Dunstable, in the railway, about ten days ago, I noticed that the remains were covered with whitish soil instead of the normal green of the short pasture belonging to the downs. Thinking that some persons had been digging at these antiquities, I took an early opportunity of going to the spot. On reaching the circles I found they had been undermined in every direction by a large number of moles. A great deal of the material from the actual floors had been brought to the surface, and on examining this chalk rubble—for such it was—I had no difficulty in securing two or three handfuls of flint flakes. Mingled with them were

a very few stones, which had been reddened and crackled by fire. No trace of burnt wood, ashes, or bone could be seen. It was remarkable that nearly all the stones found were flakes, as very few unworked pieces of flint could be lighted on. The flakes from the huts differ in condition materially from the flakes in the fields below, as all the flakes in the fields are marked with dark ferruginous strains, whilst those from the hut-floors are perfectly unstained, no iron having ever reached them.

In the immediate neighbourhood I have at different times found a large number of scapers, a lance-head, a few arrow-heads, and a few rudely-chipped celts, some broken. One small chipped celt has incurved sides, indicating, as Mr. John Evans has pointed out in his work on stone implements, that this particular form was possibly an imitation in flint of an early, flat bronze celt.

It is always well to examine the earth brought out of holes by rabbits, moles, foxes, rats, and other animals, in places where prehistoric relics exist on pasture-land. I have secured a considerable number of my antiquities from such places.

Last year I told a young niece of mine to keep a watch on such places at the spot where the five large tumuli are placed on Dunstable Downs, and where I had on previous occasions found flint flakes in the heaps made by moles, &c. It was not long before my niece lighted on two pieces belonging to the back part of a human skull. They had been scratched out of the base of the northernmost tumulus by some animal. Fortunately the two pieces fitted together; they are evidently of great antiquity, and probably represent part of the person who was buried in the tumulus, quite possibly one of the old chippers of Neolithic implements.

WORTHINGTON G. SMITH

#### A Lady Curator

IN NATURE for November 27, 1884 (p. 90) you acknowledge the receipt of the "Catalogue of the Natural History Collections of the Albany Museum, Grahamstown, Cape of Good Hope," and allude to the "zealous curator." Are you aware that that individual is a young and accomplished lady? Here is another path opened for our daughters and "sweet girl graduates" to fame and fortune. Those who, like myself, have the pleasure and privilege of knowing and corresponding with Miss Glanville can appreciate the ardour and zeal with which she is following up her chosen vocation. May every success attend her.

E. L. LAYARD

British Consulate, Noumea, February 25

#### Hoar Frost

A COMMUNICATION in NATURE of January 8 (p. 216), in regard to frost-formations, leads me to send a word from Maine. I have seen frost-work so like the description there given, that it would answer very well for an account of frosts in this climate. These frost-formations occur when the wind is chilly and blowing steadily, without the compass veering, for hours. I have compared these deposits to the most delicate designs of Oriental lace-work. At one time I witnessed an accretion on a wall, where the feathery forms were from two to four inches in length, with the points towards the wind. I think this is because each added particle adhered to the very tip of the previous one. Certainly no pen-description can do justice to the delicate beauty when the sun suddenly broke through the clouds and shone upon this forest of frost-ferns.

CAROLINE W. D. RICH

Auburn, Me., April

#### Rainbow Phenomenon

ON Saturday night, about six o'clock, I observed, at Old Trafford, on the west side of Manchester, a rainbow with accompanying phenomena, which I had never observed before. Several very heavy showers had occurred during the day. The wind was within a point or two of west. At the hour above named a cloud was passing over, very dense and uniform in colour, and with that dark leaden hue so general in thunderstorms. There was, however, no thunder or lightning. Rain fell in torrents. As the cloud, which was of large area, passed off, the sun shone brightly in the north-west, and a magnificent rainbow painted itself on the dense black screen afforded by the cloud. The rainbow was double, the prismatic colours, of course, occurring in reverse order in the outer bow. The most remarkable feature of the display was the sharp contrast in the

shadow of the cloud, evidently caused by the rainbow. Between the two bows it was of the densest leaden hue. Inside the inner bow it was exceedingly light coloured, with the faintest suggestion of luminosity. Outside the outer bow it was of an intermediate grey. The uniform mass of cloud was marked off by the two bows with geometrical accuracy into three regions, each perfectly homogeneous in itself, but distinctly contrasted with the two other tints. The effect was weird and startling, and was observed and commented upon by several spectators in whose company I was. There was another feature connected with the inner bow which I have never observed before. The green and violet colours were repeated inside the bow. Probably the whole tract from green to violet inclusive was repeated, but I could only make out those two colours distinctly.

Have these peculiarities, either or both, been observed before, and, if so, how are they accounted for? CHARLES CROFT  
Prestwich, near Manchester, May 11

#### FIVE MATHEMATICAL RARITIES

A BRIEF reference to some recent reprints, &c., by Dr. Bierens de Haan, of Leyden, may not be unacceptable, though, unfortunately, ignorance of the language in which four of them are written prevents our giving more than the barest description of them.

The "Stelkonstige Reekening van den Regenboog," or Algebraical Calculation of the Rainbow, is a rare tract, by no less distinguished an author than B. de Spinoza. It was for a long time supposed to be lost, if not burned; it is here printed in exact facsimile from a copy published at the Hague in 1687. Bound up with it is another rarity, similarly printed, entitled "Reekening van Kanssen," or Calculation of Chances. No reference to this is made by Todhunter. There is a slight probability of this tract having proceeded from the same hand, as Dr. De Haan cites a reference to the forty-third letter in the collected works of Spinoza.

The third reprint is of a very rare book by A. Girard: "Invention nouvelle en l'Algèbre, tant pour la solution des équations, que pour reconnoître le nombre des solutions qu'elles reçoivent, avec plusieurs choses qui sont nécessaires à la perfection de ceste divine science" (Amsterdam, 1629). M. Marie writes: "Cet ouvrage est surtout remarquable par les idées justes que l'auteur émet au sujet des racines négatives des équations et de leur usage en géométrie."

The last two tracts have not been before printed: they are both the work of Simon Stevin, and are entitled "Van de Spiegelende Singkonst" (i.e. Miroir de l'Art du Chant), and "Vande Molens." There is a full account prefixed to the former of these works, and we learn that the latter contains "le calcul de 19 moulins à vent, suivant la méthode usitée et suivant une nouvelle méthode de Simon Stevin lui-même, qui consiste à indiquer les roues, les dents et les pignons, afin de satisfaire à quelques conditions données."

Thanks are due to Dr. de Haan for the great care with which he has brought out these facsimiles, and we think he will certainly reap the reward he seeks. We quote his words in the last of these volumes: "J'ose espérer que la reproduction de ces ouvrages d'un homme si renommé pourra intéresser ceux qui s'occupent de l'histoire des sciences."

#### ON CERTAIN SPECTRAL IMAGES PRODUCED BY A ROTATING VACUUM-TUBE

THE beautiful effects produced by the rotation of a vacuum-tube when illuminated by a series of electrical discharges from an induction-coil are well known. The tube is generally attached to a horizontal axis, which is turned rapidly by means of a multiplying wheel; the images due to successive discharges which, if the tube were at rest, would be superposed, are thus caused to occupy different parts of the retina, and if the discharges